

1 March 1996



Aerospace Medicine

RADIATION PROTECTION PROGRAM

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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Pages: 6

Distribution: F

This instruction implements Air Force Policy Directive 48-1, AFMSC/SGPA Letter 17 Oct 84, and Air Force Instruction 40-201. It establishes responsibilities and outlines procedures for conducting the base radiation protection program. This instruction applies to Department of the Air Force civilian employees and U.S. Air Force Reserve (USAFR) members assigned to Willow Grove Air Reserve Station (WGARS).

1. Objectives. This instruction prescribes guidelines for WGARS personnel to keep exposure to radiation as low as reasonably achievable (ALARA).

2. Application. To all WGARS organizations and employees who acquire or possess radioactive materials, or equipment which produces radiation. It also applies to any agency or person who brings radioactive materials, or radiation producing equipment, onto the installation.

3. Definitions:

3.1. As Low As Reasonably Achievable (ALARA). A philosophy which states that although there are acceptable levels of radiation exposure specified by federal regulations, exposure to an individual should remain as far below these levels as can be achieved reasonably with regard to health and safety of personnel, cost and other factors. Dosimeters, investigation levels and scatter radiation surveys are examples of ALARA control measures.

3.2. Control Dosimeter. A dosimeter that measures the background radiation accumulated during the transit and storage of personnel dosimeters.

3.3. Dosimeter. A device that detects and measures accumulated radiation exposure to personnel.

3.4. Ionizing Radiation. Particles or photons which have sufficient energy to produce direct ionization in their passage through a substance (i.e., x-rays, gamma-rays, alpha particles).

3.5. Laser. A device that utilizes the natural oscillations or atoms or molecules between energy levels for generating coherent electromagnetic radiation in the ultraviolet, visible, or infrared regions of the spectrum.

3.6. Nonionizing Radiation. Electromagnetic radiation at wavelengths whose corresponding photon energy is not high enough to ionize an absorbing molecule. All radiofrequency, infrared, visible, and near ultraviolet radiation is nonionizing.

3.7. Radiation Safety Officer (RSO). An individual with specific education, military training, and professional experience in radiation protection practice designated by the commander to manage radiation safety programs.

3.8. Radioactive Material (RAM). Materials whose nuclei, because of their unstable nature, decay by emission of ionizing radiation. The radiation emitted may be alpha or beta particles, gamma or X-rays, or neutrons.

3.9. Radiofrequency. A frequency at which coherent electromagnetic radiated energy is useful for communication purposes, defined as 10 KHz to 300 Ghz.

3.10. Roentgen Equivalent Man (rem). The fraction of the radiation energy which a person is exposed to that is absorbed by the body. The unit used to equalize the biological consequences which result from equal absorbed doses of radiation.

3.11. Sievert (Sv). Standard international unit. One sievert equals 100 rem.

3.12. US Air Force Radioactive Material Permit. Written authorization from the US Air Force Radioisotope Committee for Air Force Organizations to receive, possess, distribute, use, transfer, or dispose of radioactive materials.

3.13. US Air Force Radioisotope Committee (RIC). A committee established according to, and the named licensee on, the Air Force Master Materials License to coordinate the administrative and regulatory aspects of licensing, possessing, distributing, using, transferring, transporting, and disposing of all radioactive material in the Air Force.

4. Responsibilities:

4.1. Commander. Ensure only authorized activities are conducted, establish programs to ensure activities are safely done and in compliance with requirements.

4.2. Base RSO. Must be appointed in writing by the installation commander. Sets up the overall installation radiation program and keeps the installation, tenant and subordinate commanders informed about radiation health and safety issues and effectiveness of measures to control radiation hazards.

4.3. Permit RSO. Listed in the permit by name. Check the receipt, storage, distribution, use, transfer, and disposal of radioactive materials for compliance with approved rules, AFI 40-201, Managing Radioactive Materials in the USAF, and permit conditions.

4.4. Unit RSO. Must be appointed in writing by the unit commander. A person from the unit who is most knowledgeable on operational characteristics of the radiation source used by the unit and the hazards to personnel from radiation.

4.5. Workers. Personnel using radioactive materials or equipment which produces radiation must obey the permit authorizing the material, the directives listed in the instruction, local operating instructions, and the ALARA principles.

5. Personnel Dosimetry Program:

5.1. Monitoring Criteria. Dosimetry will be performed on personnel who are likely to exceed 10 percent of the occupational exposure limit. The personnel dosimetry program will be conducted in accordance with AFI 48-125, The US Air Force Personnel Dosimetry Program, 25 July 94, and local base policies. Copies of personnel dosimetry results will be distributed to the respective functional areas RSOs for review and appropriate action.

5.2. Wearing the Whole Body Dosimeter. Wear the whole body dosimeter on the front of the body, below the shoulders and above the hips on the outside of clothing. Ensure the front surface of the dosimeter faces away from the body. When using a lead apron or similar protective garment, wear the whole body dosimeter on the outside of the basic clothing but beneath the protective garment.

5.3. Securing the Dosimeter. Secure the dosimeter in the proper position on your body before entering a radiation area or handling radioactive materials. Remove the dosimeter when you leave and store it in the area with the control dosimeter.

5.4. Storing the Dosimeter. Designate a dosimeter storage area that is as remote from ionizing radiation sources as practicable. Be sure the area is free of oil, dust, or other contaminants. Do not store dosimeters in areas of high temperature and moisture. Keep a control dosimeter in the dosimeter storage area for the entire monitoring period.

6. Radiation Surveys:

6.1. Ionizing Radiation Sources. All x-ray equipment, radioactive material storage locations and areas using permitted radioactive materials will be surveyed annually by Bioenvironmental Engineering in accordance with AFI 40-201, Managing Radioactive Materials in the USAF, 25 July 94. If possible, the surveys are encouraged to be scheduled during the annual industrial hygiene surveys.

6.2. Nonionizing Radiation Sources. Bioenvironmental Engineering compiles and keeps a current inventory of Air Force owned or operated radiofrequency (RF) emitters. In accordance with AFOSH Standard 161-9, Exposure to Radiofrequency Radiation, 12 Feb 87, Bioenvironmental Engineering will perform periodic evaluations of the hazard potential of each emitter.

6.3. Laser Sources. Bioenvironmental Engineering compiles and keeps a current inventory of all Class IIIa, IIIb, and IV lasers operated on the installation. In accordance with AFOSH Std 161-10, Health Hazards Control for Laser Radiation, 1 March 88, Bioenvironmental Engineering will periodically perform surveys to determine hazards and needed protective controls.

7. Leak Testing Procedures . Leak testing of radioactive material sources will be done by the radioactive material permittee, in accordance with T.O. 00-110N-3, and the respective radioisotope permit. The RSO will monitor compliance.

8. Receiving and Shipping of Radioactive Materials .

8.1. Base organization. All requests for new radioactive materials or ionizing producing devices are reviewed by the RSO before use. The Individual Exemption Codes (IEX) codes and permit/license system will be used to control issues.

8.2. Non-Air Force Organizations. In accordance with AFI 40-201, non-Air Force organizations that bring radioactive materials or radiation producing devices (ionizing or radiofrequency producing devices to include but not limited to the following items: x-ray producing devices, electron beams, neutron utilizing devices, lasers, radar or other devices radiating electromagnetic energy, excluding communication radios), on Air Force installations or conduct operations using radioactive materials on Air Force installations must get the approval of the installation commander. To get this approval, the non-Air Force organization must send a request to the base RSO at least 30 calendar days before bringing the materials onto the installation. For contractors these requirements must be included in the statement of work. The items required in the request are outline in AFI 40-201, section 3.4.18.2.

9. Permit or License Procedures:

9.1. Stock Listed Items and Commodities. The RSO will send an application in letter format to the RIC (AFMOA/SGPR) through their MAJCOM. The letter should include the following.

9.1.1. Name, mailing address and telephone number of the applicant and using organization. Applicant must be a commander or supervisor (branch chief or above). Also FAX number and e-mail if applicable.

9.1.2. Item name, stock number, number of items needed, intended use of the desired item.

9.2. Non-Stock Listed Items. Permit applicant prepares the application. The RSO reviews the permit and forwards to MAJCOM, who forwards it to AFMOA/SGPR).

9.2.1. Include the information outlined in AFI 40-201, attachment 3. Identify the item by manufacturer and model number. Identify each radioactive source in the item by specific radioisotope, chemical or physical form, and maximum activity. Indicate the numbers of each source needed, including spares. The intended use of the desired item.

9.3. Application Process. In response to the initial application, the applicant will receive a list of conditions that the organization commander must review, sign and return to the RIC. The RIC will countersign the list of conditions and return it to the applicant as a valid permit.

9.4. Permit Amendments. Needed for changes in users, RSOs, facilities, or procedures (types and quantities of materials, shielding).

9.4.1. For termination or name changes, we must inform the RIC within 15 calendar days.

9.4.2. Send the request to arrive at AFMOA/SGPR no later than 30 days prior to when you need the changes.

9.5. Transfer, Disposal, Transportation of RAM and Waste.

9.5.1. For disposal the generator, or user, will initiate a written request for disposal instructions.

9.5.1.1. The request will contain: the national stock number, nomenclature, quantity, type of radionuclide, physical form, chemical form, activity per item in curies, intensity in milliroentgen (mR)/hr at 4 inches from surface of unpackaged article, point of contact.

9.5.1.2. The generator will forward the request to the base RSO. The RSO will review and

approve the form through a first endorsement. The generator will then forward the request to SA-ALC/EMP.

9.5.1.3. SA-ALC/EMP will provide written instructions concerning disposal for the waste. They will provide guidance for disposal of all radioactive waste.

9.5.2. The user must tell the Transportation Office the radionuclide, activity, chemical and physical form, item nomenclature, and stock number.

9.6. Radioactive Materials Incidents and Accidents. When in doubt report any incident to the RSO. The RSO will then report it to the RIC. The time limit for compliance starts from the time of discovery.

10. Quality Assurance:

10.1. Personnel Dosimetry. The following are the action levels which will serve as a guide in determining surveillance and control requirements.

10.1.1. Overexposure Action Level (Whole Body), 5 rem (0.05 Sv) per year.

10.1.2. Abnormal Exposure Action Level, 417 mrem (4.17 mSv) per month, 1250 mrem (12.5 mSv) per quarter.

10.1.3. Investigation Action Level.

10.1.3.1. Medical X-Ray, 17 mrem (0.17 mSv) per year.

10.1.3.2. Non-Destructive Inspection, 10 mrem (0.1 mSv) per year.

10.1.4. Pregnant Female Action Level, 50 mrem (0.5 mSv) per month.

10.2. Pregnant Workers. Personnel dosimetry results for pregnant female workers will be reviewed by the RSO monthly and documentation maintained on actions taken to ensure that the total dose to the fetus does not exceed 500 mrem during the term of pregnancy. Positive efforts should be made to limit the dose to no more than 50 mrem per month.

10.3. Quarterly radiation protection program reviews. These reviews will be presented to the Aerospace Medicine Council.

10.3.1. A review of all personnel dosimetry results for the previous quarter to ensure that adverse trends are noted and that all personnel dosimetry results which exceed action levels are acted upon.

10.3.2. A review of all radiation survey results for the previous quarter to ensure that all required surveys have been performed and documented properly, and that corrective action, if necessary, has been accomplished.

10.4. Annual radiation protection program reviews. These reviews will be accomplished by the RSO and documented. These reviews will be presented to the Aeromedical Medicine Council.

10.4.1. A review of all local implementing directives to ensure they are correct.

10.4.2. A review of all radiation survey results for the past year to ensure that all required surveys have been performed and documented properly and that corrective action, if necessary, has been accomplished.

10.4.3. A review of all personnel dosimetry results for the past year to ensure that adverse trends are noted and appropriate action has been taken on results that exceed standards or action levels.

10.4.4. An update of the radiation source and radioactive material inventory.

10.4.5. A review of USAF Radioactive Materials Permits and NRC licenses to ensure currency and compliance with requirements.

11. Pregnant Workers:

11.1. Medical Providers and Supervisors. Refer pregnant workers whose duties involve exposure to ionizing radiation to Bioenvironmental Engineering for counseling and additional actions as may be appropriate. Civilian pregnant workers, not followed by Air Force medical providers, should report directly to Bioenvironmental Engineering.

11.2. RSO. Upon notification, evaluates the exposure potential for each pregnant worker, and advises on protective measures to be taken to protect the mother and fetus.

12. Review of Plans for Modifications and New Facilities . Review of all plans and specifications for modification of facilities which involve the use of radioactive material or radiation producing devices must be reviewed by the RSO to ensure that ALARA is considered. The review will be conducted during Bioenvironmental Engineering's normal engineering review procedure.

13. Radiation Safety Training . Training will be accomplished by the SGPB office for the full-time employees and the 913th MDS/SGPM office for the reservist. Initial training will be conducted before, or as soon as possible after, assignment to work areas involving radiation exposure. Annual refresher training will be conducted to reemphasize and reinforce training objectives. The level of training should be tailored to the specific category of personnel and the hazard presented. Documentation of the training will be maintained locally by the respective functional area RSO and a copy will be forwarded to the Bioenvironmental Engineering Section for inclusion in Tab F of the industrial case file. Such training shall, as a minimum, include instructions in the following areas.

13.1. Risk from radiation exposure.

13.2. Health risks to children of women who are occupationally exposed to radiation during pregnancy.

13.3. Maximum permissible dose limits.

13.4. Protective measures required (tailored to specific radiation work).

13.5. ALARA philosophy and practice.

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Commander